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EXAMINER	
SONG, MATTHEW J	

ART UNIT	PAPER NUMBER
1765	5

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No. 09/931,537	Applicant(s) COLEMAN, THOMAS G.
	Examin r Matthew J Song	Art Unit 1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-24,26-33,35,36 and 46-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 7-24, 26-33, 35-36 and 46-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7-12, 14-17, 20, 23-24, 26-33, 35-36 and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkahsov (US 4,978,556) in view of Davis et al (US Re. 34,861) and Kuehnle (US 5,879,518).

Pinkahsov discloses an arc-vapor deposition of metals on a substrate, where an electric arc is struck between two electrodes and causes the evaporation of the material from the electrode so that this material, in the compound state in which it was originally found in the electrode, is deposited upon a substrate (col 1, ln 1-67). Pinkahsov also discloses the electrode material is crystalline silicon carbide (col 2, ln 45-60). Pinkahsov also discloses an electrode **22** of silicon carbide and an identical electrode **20** are provided within an enclosure **24** and silicon carbide is deposited on a substrate **23** (col 3, ln 1-47 and Fig 2). Pinkahsov also discloses the electrode **22** is reciprocated by a drive **26** into and out of contact with the electrode **20** while an arc source is connected across the electrodes (col 3, ln 48-67). Pinkahsov also discloses the electrode body is formed by sintering particles in a form in a vacuum oven (col 3, ln 20-30). Pinkahsov also discloses a DC current **27** between electrodes (Fig 2).

Pinkahsov does not disclose the substrate is a seed of silicon carbide.

Davis et al teaches a method of growing a single crystal of silicon carbide by introducing a monocrystalline seed crystal of silicon carbide **17** and introducing a silicon carbide source powder in a sublimation furnace **23** (col 6, ln 1-67). Davis et al also teaches after introduction of the seed and source powder, the temperature of silicon carbide source powder is raised to a temperature sufficient for silicon carbide to sublime into Si, Si_2C and SiC_2. Davis et al also teaches the temperature of the seed crystal is raised to a temperature approaching the temperature of the source powder, but lower than the temperature at which silicon carbide will sublime and by maintaining the temperature of the source powder and seed crystal growth of monocrystalline silicon carbide will form upon the seed crystal (col 7, ln 20-67). Davis et al also teaches the source powder is selected and controlled so that the relative amounts of Si, Si_2C and SiC_2 which are generated will remain constant and the other parameters of the process can be can be appropriately controlled to result in the desired single crystal growth upon the seed crystal (col 7, ln 20-35) and maintaining a constant flux (claim 1). Davis et al also teaches other method of introducing silicon carbide by using silane and ethylene gases to react and form silicon carbide (col 11, ln 50 to col 12, ln 35). Davis also teaches maintaining a pressure of 10 Torr for six hours resulting in a 6 mm thick SiC crystal (col 13, ln 1-25).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pinkahsov with Davis et al's monocrystalline seed crystal of silicon carbide to grow a single crystal of a desired polytype of silicon carbide suitable for producing electrical devices (claim 1, col 4, ln 50-69 and col 6, ln 40-55).

The combination of Pinkahsov and Davis et does not teach controlling the power dissipated across the gap to control the flow of vaporized Si, Si_2C, and SiC_2 from the silicon carbide electrode to the seed of silicon carbide.

In a method of vaporizing by a material by establishing an electric arc, note entire reference, Kuehnle teaches an electric arc is ignited between electrodes **34** and **66** and a controller **102** controls step motors **48** and **82** in response to signals from a gap sensor. The controller advances the electrodes **34** and **66** toward one another as the material at the electrode ends is consumed by the vaporization process (col 4, ln 1-67). Kuehnle also teaches the gap increase is detected and step motors **40** and **82** advance the electrodes to maintain a selected gap width (col 5, ln 60 to col 6, ln 10 and claim 4). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov and Davis et al with Kuehnle to vaporize the electrode material at a steady level (col 4, ln 15-25), thereby avoiding undesired changes in flux resulting in uniform polytype

Referring to claim 2, the combination of Pinkahsov, Davis et al and Kuehnle teaches identical electrodes, **22** and **20,** of silicon carbide.

Referring to claim 3, the combination of Pinkahsov, Davis et al and Kuehnle et al teach a similar means of maintaining a constant gap between electrodes, as applicant, note instant claim 4, therefore inherently controls the power dissipated across the gap to control the flow of vaporized Si, Si_2C and SiC_2.

Referring to claims 5, the combination of Pinkahsov, Davis et al and Kuehnle teaches maintaining the system at a pressure of 10 Torr for six hours ('861 col 13, ln 1-25).

Referring to claim 14, the combination of Pinkahsov, Davis et al and Kuehnle et al teach maintaining a constant temperature and a constant gap between electrodes to maintain a constant flux.

Referring to claim 17, the combination of Pinkahsov, Davis et al and Kuehnle teaches rotating the seed crystal, note claim 27 of Davis et al.

Referring to claim 23, the combination of Pinkahsov, Davis et al and Kuehnle teaches maintaining the temperature, pressure and constant voltage by maintaining a constant gap between electrodes.

Referring to claims 33 and 35-36, the combination of Pinkahsov, Davis et al and Kuehnle teaches an electric arc, this reads on applicant's local high temperature zone, and moving a silicon carbide electrode, thereby vaporizing the silicon carbide electrode, reads on applicant's introducing a silicon carbide source.

3. Claims 1-5, 7-12, 14, 17-20, 23-24, 26-30 and 32-33, 35-36 and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkahsov (US 4,978,556) in view of Davis et al (US Re. 34,861) and Smalley et al (US 5,227,038).

The combination of Pinkahsov and Davis et al teach all of the limitations of claim 1, as discussed previously, except controlling the power dissipated across the gap to control the flow of vaporized Si, Si_2C, and SiC_2 from the silicon carbide electrode to the seed of silicon carbide.

In an electric arc method of making Fullerenes, note entire reference, Smalley et al teaches carbon must be heated to temperature sufficient to from a carbon vapor and electrical current arced between two electrodes provides the energy necessary to heat the carbon to a

vapor. Smalley et al also teaches each electrode is formed of carbon and therefore serves as both an electrode and a carbon source. Smalley et al also teaches carbon should be placed in close proximity to the electrical arc between the electrodes and graphite dust could be passed through an electrical arc between the two electrodes to form the carbon vapor (col 2, ln 30-69 and col 8, ln 60 to col 9, ln 35). Smalley et al also teaches the electrodes are consumed during fullerene generation and it is desirable to provide some means for advancing the electrodes towards a gap area in order to maintain the desired gap for the electrical arc, such as a thread rod feed mechanism **28** (col 6, ln 60 to col 7, ln 50). Smalley et al also teaches provision should also be made for lateral movement of an electrode **14** and to laterally move electrodes in order to maintain the arc gap in the appropriate location within a vaporization chamber **10** (col 7, ln 1-67). Smalley et al also teaches an electrical power source may provide alternating or direct voltage and optimum fullerene generation may by obtained by adjusting the frequency (col 4, ln 1-67), this is a teaching that frequency is a result effective variable.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov and Davis et al with Smalley's means for maintaining a desired gap for the electrical arc to maintain an optimum length of the arc gap during the entire process (col 4, ln 30-60).

Referring to claim 3, the combination of Pinkahsov, Davis et al and Smalley et al teach a similar means of maintaining a constant gap between electrodes, as applicant, note instant claim 4, therefore inherently controls the power dissipated across the gap to control the flow of vaporized Si, Si_2C and SiC_2.

Referring to claim 14, the combination of Pinkahsov, Davis et al and Smalley et al teach maintaining a constant temperature and a constant gap between electrodes to maintain a constant flux.

Referring to claim 18-19, the combination of Pinkahsov, Davis et al and Smalley et al teach using alternating current is an electrical arc process, note Smalley et al, and frequency is a result effective variable. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify combination of Pinkahsov, Davis et al and Smalley et al by optimizing the frequency by conducting routine experimentation (MPEP 2144.05).

Referring to claim 33, the combination of Pinkahsov, Davis et al and Smalley et al teach vaporizing silicon carbide by creating an electrical arc, this reads on applicant's local high temperature zone, to vaporize electrodes composed of silicon carbide, this reads on applicant's silicon carbide source material, and moving the electrodes to maintain a constant gap. The combination of Pinkahsov, Davis et al and Smalley et al also teach supplying an additional source by vaporizing dust supplied between two electrodes, which are capable of lateral movement to maintain a desired position in a chamber.

4. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkahsov (US 4,978,556) in view of Davis et al (US Re. 34,861) and Kuehnle (US 5,879,518) or Smalley et al (US 5,227,038) as applied to claims 1-5, 7-12, 14, 17, 20, 23-24, 26-30, 32-33, 33, 34, 36, and 46-47 above, and further in view of Jaussaud et al (US 6,113,692).

The combination of Pinkahsov, Davis et al and Kuehnle or the combination of Pinkahsov, Davis et al and Smalley et al teach all of the limitations of claim 13, as discussed previously,

except the temperature of the inner walls of the furnace to a temperature higher than the temperature of the seed.

In a method of forming silicon carbide by sublimation, note entire reference, Jaussaud et al teaches covering the walls of a chamber with silicon carbide and establishing a temperature difference between the silicon carbide layer of the wall and a nucleus, i.e. seed crystal. Jaussaud et al also teaches the silicon carbide of the wall acts as a source of silicon carbide during growth (col 2, ln 25 to col 3, ln 30). Jaussaud et al also teaches the temperature of the wall is higher than the temperature of the seed (col 3, ln 31-55). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov, Davis et al and Kuehnle or the combination of Pinkahsov, Davis et al and Smalley et al with Jaussaud et al's silicon carbide covered wall with a higher temperature than a seed crystal to provide an additional source of silicon carbide to improve productivity.

5. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkahsov (US 4,978,556) in view of Davis et al (US Re. 34,861) and Kuehnle (US 5,879,518) as applied to claims 1-5, 7-12, 14, 17, 20, 23-24, 26-30, 32-33, 33, 34, 36, and 46-47 above, and further in view of Fey et al (US 4,582,004).

The combination of Pinkahsov, Davis et al and Kuehnle teach a DC power supply. The combination of Pinkahsov, Davis et al and Kuehnle teach all of the limitations of claim 18, as discussed previously, except an alternating current supply.

In an electric arc heater process, note entire reference, Fey et al teaches an electric arc heater provided with electric power **11**, either AC or DC (col 3, ln 20-67). It would have been

obvious to a person of ordinary skill in the art at the time of the invention to modify combination of Pinkahsov, Davis et al and Kuehnle with Fey et al's AC power because substitution of known equivalents for the same purpose is held to be obvious (MPEP 2144.06).

Referring to claim 19, combination of Pinkahsov, Davis et al, Kuehnle and Fey et al is silent to operating the current power supply to maintain the same rate of vaporization of the silicon carbide electrode. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov, Davis et al, Kuehnle and Fey et al by optimizing the frequency to produce a steady state vapor flux to avoid undesirable compositional changes to the silicon carbide because frequency is a result effective variable, as taught by Smalley et al below.

6. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkahsov (US 4,978,556) in view of Davis et al (US Re. 34,861) and Kuehnle (US 5,879,518) or Smalley et al (US 5,227,038) as applied to claims 1-5, 7-12, 14, 17, 20, 23-24, 26-30, 32-33, 33, 34, 36, and 46-47 above, and further in view of Otsuki et al (US 6,090,733).

The combination of Pinkahsov, Davis et al and Kuehnle or the combination of Pinkahsov, Davis et al and Smalley et al teach all of the limitations of claim 21, as discussed previously, except the silicon carbide electrode is formed form an n-type carrier rich silicon carbide source powder.

In a method of sintering silicon carbide, note entire reference, Otsuki et al teaches electric conductivity of silicon carbide is generally provided by being doped with p-dopants and n-dopants (col 3, ln 1-35). Otsuki et al also teaches nitrogen may be added in combination with as

silicon source and a carbon source in the preparation of the powder of silicon used a material powder (col 8, ln 15-35). Otsuki et al also teaches the sintered product may be used as an electrode (col 16, ln 30-50). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov, Davis et al and Kuehnle or the combination of Pinkahsov, Davis et al and Smalley et al with Otsuki et al's doped silicon source powder to form an electrode with desired electrical conductivity.

7. Claim 22 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkahsov (US 4,978,556) in view of Davis et al (US Re. 34,861) and Kuehnle (US 5,879,518) or Smalley et al (US 5,227,038) as applied to claims 1-5, 7-12, 14, 17, 20, 23-24, 26-30, 32-33, 33, 34, 36, and 46-47 above, and further in view of Kijima et al (US 5,093,039).

The combination of Pinkahsov, Davis et al and Kuehnle or the combination of Pinkahsov, Davis et al and Smalley et al teach all of the limitations of claim 22, as discussed previously, except the silicon carbide electrode is formed form a p-type carrier rich silicon carbide source powder.

In a method of sintering silicon carbide, note entire reference, Kijima et al teaches boron, or aluminum, this reads on applicant's p-type carrier, is added to silicon carbide powder and sintered into silicon carbide bodies (col 1, ln 30-65). Kijima et al also teaches silicon carbide powder prepared by plasma CVD (col 4, ln 45-67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov, Davis et al and Kuehnle or the combination of Pinkahsov, Davis et al and Smalley et al with

Kijima et al's p-type silicon carbide powder to increase the density of the silicon carbide (col 1, ln 35-40).

Response to Arguments

8. Applicant's arguments filed 5/6/2003 have been fully considered but they are not persuasive.

In response to applicant's first argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). The motivation to combine the Kuehnle reference or the Smalley reference is taught by the Kuehnle reference. Kuehnle et al teaches the controller advances the electrodes as the material at the electrode ends is consumed by the vaporization process so that the electrode material vaporizes at a substantially steady level, note column 4, lines 13-25, which is desirable.

In response to applicant's second arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Pinkashov reference teaches two silicon carbide electrodes and an electric arc is struck between the two electrodes, which causes the evaporation of material from the electrode, note column 1, lines 30-60 and

column 2, lines, 45-50. The Kuehnle reference teaches vaporizing a material by establishing an electric arc between two electrodes and maintaining a selected gap width, note column 5, line 60 to column, 6, line 10 and Claim 4.The Kuehnle reference also teaches the electrode material is vaporized at a steady level by maintaining the selected gap, note column 4, lines 13-25. The Pinkashov reference merely teaches a method of vaporizing the electrode material by repeatedly striking the electrodes together and then separating them to form an arc between them. The Kuehnle reference teaches an alternative method of vaporizing electrode material by establishing an electric arc between electrode and maintaining a constant gap. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use an alternative method of vaporizing electrode material, where the material is vaporized steadily.

In response to applicant's argument that the Kuehnle reference is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, control loops for controlling the power dissipated across a gap between electrodes in an electric arc vaporization is known in the art and the Kuehnle reference is relied upon as a teaching of controlling the energy flow across a gap in an electric arc vaporization, note column 4, lines 1-45. Therefore, the Kuehnle reference is analogous art because control in electric arc vaporization is applicable to electrodes of different materials.

Applicant's argument that the skilled artisan would look to the teachings of Davis regarding controlling the temperature and pressure to maintain a steady flux instead of the

Kuehnle reference has been noted but has not been found persuasive. The combination of Davis and Pinkahsov teaches electric arc sublimation of silicon carbide. The combination of Davis and Pinkahsov does not teach a method of maintaining a steady flux in an electric arc vaporization. The Kuehnle reference teaches a method of controlling the gap between two electrodes in an electric arc vaporization to maintain a steady flow. Controlling the gap between electrodes to maintain a steady flow in electric arc vaporization is known in the art. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov and Davis with Kuehnle's method of providing a steady flow of vaporized electrode material in an electric arc vaporization by maintaining a constant gap. Furthermore, applicant merely discusses the Davis reference and does not show how the Kuehnle reference is unrelated to the combination of Davis and Pinkahsov, which teaches electric arc vaporization and the rejection is based upon.

Applicant's arguments against the Smalley reference have been noted but have not been found persuasive. The Applicant contends the Pinkahsov reference teaches away from the combination of references because the Pinkahsov reference teaches repeatedly striking the electrodes together. The Pinkahsov reference merely teaches a single embodiment where the electrodes are repeatedly struck together and is not as limited as suggested by applicant. The Smalley reference teaches an electric arc vaporization, as the Pinkahsov reference, where a gap between electrodes is maintained constant. Alternative methods of operating an electric arc apparatus are known in the art and a method of maintaining a constant gap between electrodes is known in the art to result in a steady flow of vaporized material, which is desirable. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to

employ Smalley's method of maintaining a constant gap across electrodes in an electric arc apparatus.

In response to applicant's argument that the Smalley reference is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, control loops for controlling the power dissipated across a gap between electrodes in an electric arc vaporization is known in the art and the Smalley reference is relied upon as a teaching of controlling the position of electrodes to maintain a constant gap between electrodes, which results in a steady flow of vaporized material. Therefore, the Smalley reference is analogous art because control in electric arc vaporization can be applied to electrodes of different materials.

Applicant's argument that the Smalley reference is unrelated has been noted but has not been found persuasive. The Smalley reference teaches an electric arc vaporization, where a constant gap is maintained. Controlling the gap between electrodes to maintain a steady flow in electric arc vaporization is known in the art. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Pinkahsov and Davis with Smalley's method of maintaining a constant gap. Furthermore, applicant merely discusses the Davis reference and does not show how the Smalley reference is unrelated to the combination of Davis and Pinkahsov, which teaches electric arc vaporization and the rejection is based upon.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Carter et al (US 6,025,289) teaches a source material is heated to temperature that causes the source material to create a vapor flux that deposits vaporized Si, Si_2C and SiC_2 on a seed and reproducible growth is achieved by maintaining a constant flux (col 2, ln 30-67).

Pinkahsov (US 4,505,948) teaches an electric arc process, note entire reference.

Yano et al (WO 00/39372) teaches the temperature of an inner wall of a vessel for growing silicon carbide is higher than a seed crystal (Abstract).

Dunn et al (US 4,422,172) teaches an electrode mounted on a movable arm and the electrode is movable to adjust the electrode to maintain a constant arc in a furnace (Abstract).

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS
July 7, 2003

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700